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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE
BROOKS AIR FORCE BASE TEXAS

9 Dec 94

MEMORANDUM FOR AFBCA/OL 3A
ATTN: Mr. Brady Baker
324 US Oval
Plattsburgh AFB, NY 12903-3316

FROM: HQ AFCEE/ERT
8001 Arnold Drive
Brooks AFB TX 78235-5357

SUBJECT: Completion of One Year Bioventing Test, Fire Training Pit 3

The Air Force Center for Environmental Excellence (AFCEE) one-year bioventing test and evaluation project at Fire Training Pit 3 has been completed. Figure 1 provides general site information and Table 1 provides a summary of initial, six-month, and one-year fuel respiration and degradation rates measured at several monitoring points. Biodegradation rates have gradually decreased over the one-year pilot tests. These decreases are best explained by the reduction of contaminant levels as the bioventing continued. Table 2 provides a summary of initial and final soil and soil gas analytical results for total recoverable petroleum hydrocarbons (TRPH) and benzene, toluene, ethyl benzene, and xylenes (BTEX). Based on results from your sites and 108 other sites currently under operation, bioventing is cost-effectively remediating fuel contamination in a reasonable time frame. We recommend its application throughout the Fire Training area, and at other sites on your installation using the criteria in the AFCEE Test Plan and Technical Protocol for a Field Treatability Test for Bioventing, May 1992, including Addendum One, February 1994.

The objective of the one-year sampling effort was not to collect the large number of samples required for statistical significance. It was conducted to show relative reductions in TRPH and BTEX concentrations. Soil gas samples are somewhat similar to composite samples in that they are collected over a wider area. Thus, they provide a good indication of changes in soil gas profiles and volatile contaminant concentrations (see Addendum One to Test Plan and Technical Protocol for a Field Treatability Test for Bioventing - Using Soil Gas Surveys to Determine Bioventing Feasibility and Natural Attenuation Potential, February 1994). Soil samples, on the other hand, are discrete point samples subject to large variabilities over small distances/soil types. Given this variability, coupled with known sampling and analytical variabilities, a large number of samples would have to be collected to conclusively determine "real" changes in soil

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contamination. Because of the limited number of samples, these results should not be viewed as conclusive indicators of bioventing progress or evidence of the success or failure of this technology. In situ respiration tests are considered to be better indicators of hydrocarbon remediation than limited soil sampling.

The soil analytical results for Fire Training Pit 3 are not conclusive. The soil analysis for VW-17 shows an increase from 9.0 mg/kg TRPH to 1,040 mg/kg TRPH, while the analysis for MPA-2 shows a decrease from 19,000 to 9,440 mg/kg TRPH. Additionally, in May 94, the US EPA Robert S. Kerr Environmental Research Laboratory obtained and analyzed soil samples from the Fire Training Pit 3 area. These soil samples were taken from depths of 10.1 to 12.5 feet, and from 31.5 to 36.5 feet (Atch 2, samples 84BA 1-20). BTEX and TCE levels were either nondetect or below quantitative limits. However, soil analytical results from soil samples taken at adjacent fire training pits indicate significant BTEX and TRPH levels where bioventing systems have not been placed into operation.

Soil gas analytical results indicate that a reduction in BTEX has taken place in the soils within the treatment radius of the pilot vent well. The soil gas analytical measurements indicate that fuel biodegradation is progressing at a significant rate. AFCEE recommends that the bioventing pilot system continue to operate while planning for an expansion of the system for full-scale remediation. System expansion to a full-scale bioventing system can be contracted through AFCEE. Please contact Jerry Hansen, AFCEE/ERT, DSN 240-4353, COM 210-536-4353, to discuss technical and contractual options for full-scale expansion.

Data from your base and many others indicate that BTEX compounds are preferentially biodegraded over TRPH. Since BTEX compounds represent the most toxic and mobile fuel constituents, a BTEX standard is a risk-based standard. Attachment 4 summarizes the BTEX/TRPH issue and a report entitled "Use of Risk-based Standards for Cleanup of Petroleum Contaminated Soil," June 94, which was recently sent under separate cover ("tool box") will assist you in negotiating for a BTEX cleanup standard.

In general, quantitative destruction of BTEX will occur over a one- to two-year bioventing period. Soil gas surveys and respiration tests can be used as BTEX destruction indicators. If a non-risk-based/TRPH cleanup is chosen, the pilot and full-scale systems should be operated until respiration rates approach background rates. We recommend that confirmatory soil sampling be conducted four to six months after background respiration rates are approached.

Because this is a streamlined test and evaluation project, our contract does not provide for additional reports to the base on pilot study results. The interim results report contains as-builts and initial data. This letter summarizes all data collected and provides next step recommendations. AFCEE will continue operating the Fire Training Pit 3 bioventing system (and the systems at Pits 1, 2, and 4, when turned on) until Oct 95. We are initiating a contract to extend monitoring at some sites beyond the initial

one-year test. Monitoring will include soil gas and respiration tests to document hydrocarbon degradation and will also include the collection of sufficient final soil samples to statistically demonstrate site cleanup. If you are interested, please call us.

On behalf of the AFCEE/ERT staff, I would like to thank you for your support of these bioventing test and evaluation projects. The information gained from each site will be invaluable in evaluating this technology and will promote its successful application on other DOD, government, and private sites. I have attached a customer satisfaction survey. Please take a few minutes to fill it out and tell us how we did. We look forward to hearing from you.

ROSS N. MILLER, Lt Col, USAF, BSC
Chief, Technology Transfer Division

Attachments:
1. Fire Training Pit 3 Data
2. US EPA R. S. Kerr Lab Data
3. Addendum
4. "Using Risk-based Standards will Shorten Cleanup Time at Petroleum Contaminated Sites"
5. Survey

cc: AFCEE/ERB (Bruce King)
ACC/CEVR
AFBCA/EV

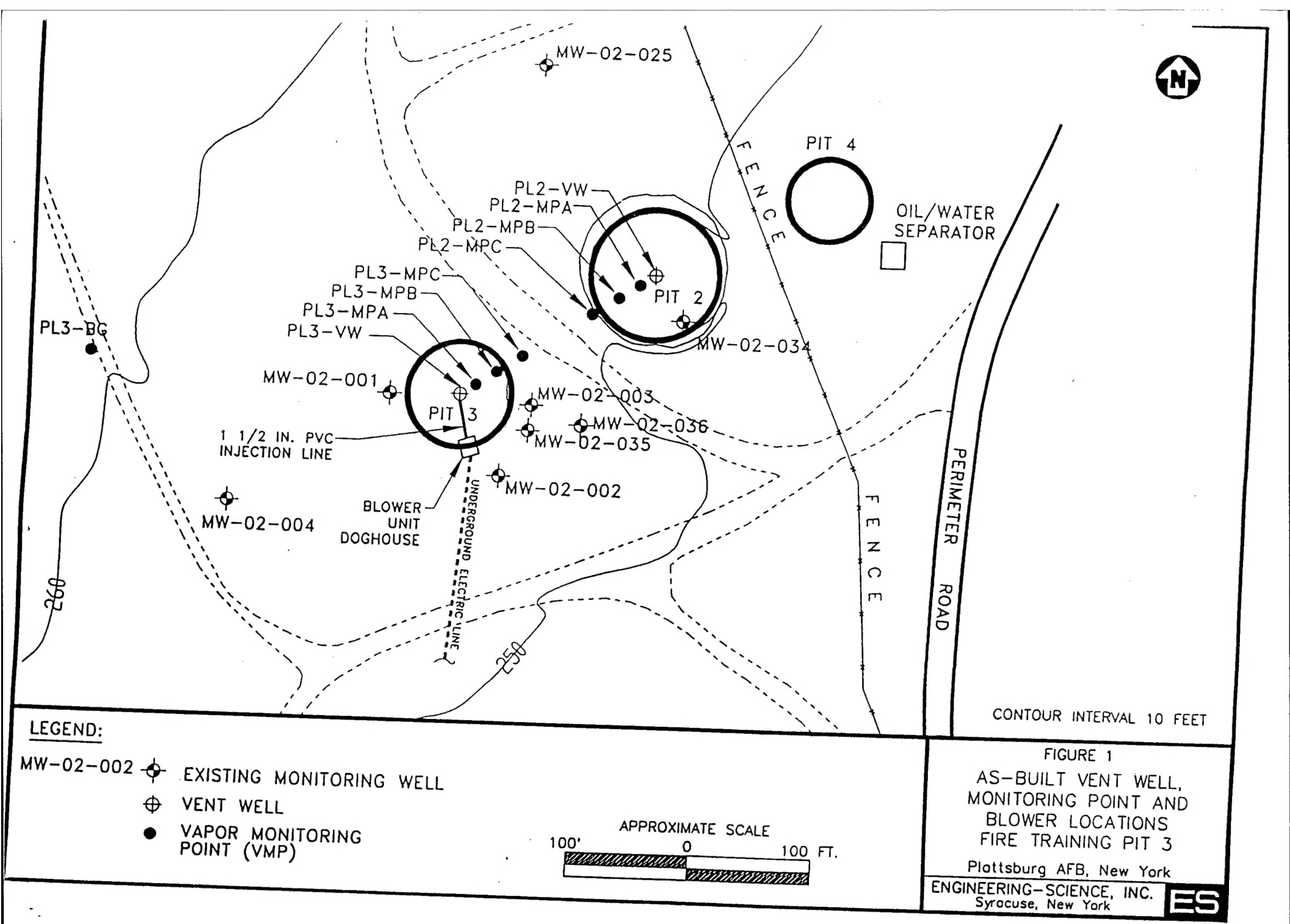

FIGURE 1

AS-BUILT VENT WELL, MONITORING POINT AND BLOWER LOCATIONS FIRE TRAINING PIT 3

Plattsburg AFB, New York

ENGINEERING-SCIENCE, INC.
Syracuse, New York

ES

TABLE 1
FIRE TRAINING PIT 3
RESPIRATION AND DEGRADATION RATES
PLATTSBURGH AFB, NY

Location–Depth	Initial (July 1992)			6–Month (June 1993)[b/]			1–Year (March 1994)[c/]		
	K_o (% O_2/min)	Degradation Rate (mg/kg/year)[a/]	Soil Temperature (°C)	K_o (% O_2/min)	Degradation Rate (mg/kg/year)	Soil Temperature (°C)	K_o (% O_2/min)	Degradation Rate (mg/kg/year)	Soil Temperature (°C)
PL3–MPA–9	0.014	4300[d/]	15.0	0.0028	690[d/]	14.3	0.0022	390[d/]	7.9
PL3–MPA–29	NS[e/]	NS	7.8	NS	NS	7.6	NS	NS	14.0
PL3–MPB–29	NS	NS	NS	NS	NS	NS	0.00092	270	NS

[a/] Milligrams of hydrocarbons per kilogram of soil per year.
[b/] Assumes moisture content of the soil is average of initial and final moistures.
[c/] 1–Year respiration test was performed approximately 30 days after blower system was shut off.
[d/] Assumes average moisture content of soil samples from VW–17 and MPA–2.
[e/] NS=Not Sampled.

TABLE 2

FIRE TRAINING PIT 3
INITIAL AND 1-YEAR SOIL AND SOIL GAS ANALYTICAL RESULTS
PLATTSBURGH AFB, NY

Analyte[a] (Units)	Sample Location-Depth (feet below ground surface)			
	MPA-9		MPB-29	
Soil Gas Hydrocarbons	Initial[b]	1-Year[c]	Initial[b]	1-Year[c]
TVH (ppmv)	8,400	16	35	3.8
Benzene (ppmv)	6.9	<0.002	0.02	<0.002
Toluene (ppmv)	21	0.030	0.10	<0.002
Ethylbenzene (ppmv)	3.2	0.008	0.03	<0.002
Xylenes (ppmv)	27	0.024	0.33	<0.002

	VW-17		MPA-2		MPA-25	
Soil Hydrocarbons	Initial[d]	1-Year[e]	Initial	1-Year	Initial	1-Year
TRPH (mg/kg)	9.0	1040	19000	9440	NS[f]	1380
Benzene (mg/kg)	<0.0006	<0.14	<0.0006	<0.28	NS	<0.13
Toluene (mg/kg)	0.024	<0.14	0.043	<0.28	NS	<0.13
Ethylbenzene (mg/kg)	0.001	<0.14	0.014	1.8	NS	<0.13
Xylenes (mg/kg)	0.047	<0.19	0.088	2.9	NS	0.24
Moisture (%)	3.4	10.5	6.1	10.4	NS	5.1

[a] TVH = total volatile hydrocarbons; ppmv = parts per million, volume per volume;
TRPH = total recoverable petroleum hydrocarbons; mg/kg = milligrams per kilogram.
[b] Initial soil gas samples collected on 7/15/92.
[c] 1-Year soil gas samples collected on 3/1/94.
[d] Initial soil samples collected on 7/7/92.
[e] 1-Year soil samples collected on 3/24/94.
[f] NS = Not Sampled.

MANTECH

Ref: 94-DK13/vg
July 10, 1994

Dr. Don Kampbell
R.S. Kerr Environmental Research Lab
U.S. Environmental Protection Agency
P.O. Box 1198
Ada, OK 74820

THRU: S.A. Vandegrift ~~DOF~~ for SAV

Dear Don:

This report contains the results of my GC/MSD analysis of Plattsburg AFB core extracts for quantitation of benzene, toluene, ethylbenzene (EB), p-Xylene, m-Xylene, o-Xylene, 1,3,5-trimethylbenzene (1,3,5-TMB), 1,2,4-trimethylbenzene (1,2,4-TMB) and 1,2,3-trimethylbenzene (1,2,3-TMB) and trichloroethene (TCE) as per Service Request #SF-0-64.

The analytical method was a modification of RSKSOP-124. Alkylbenzene compounds were chromatogrammed as follows: cool on-column injection (0.5 µl) was used with electronic pressure control (EPC) set for a constant flow of 0.9ml/min. A 30m X 0.25mm Restek Stabilwax (Crossbonded Carbowax-PEG, 0.5µm film) capillary GC column with 9" X 0.53mm ID uncoated capillary precolumn was used. For TCE a 30m X 0.25mm J&W DB5MS with 0.5µm film was used. Quantitation was based on calibration curves of a single target ion for each compound with the addition of up to three qualifier ions recorded to verify chromatographic separation or purity. The ions chosen were those listed in EPA method 524.2 Revision 3.0. Standards calibration ranged from 0.01 to 400µg/ml. Complete reports detailing the acquisition methods and calibration curves have been recorded. GC/MSD data acquisition was June 28-July 1, 1994 for alkylbenzenes and July 8-9, 1994 for TCE.

If I can be of further assistance, please feel free to contact me.

Sincerely,

David A. Kovacs

xc: R.L. Cosby
J.L. Seeley jls
G. Smith

ManTech Environmental Research Services Corporation
R.S. Kerr Environmental Research Laboratory, P.O. Box 1198, 919 Kerr Research Drive
Ada, Oklahoma 74821-1198 405-436-8660 FAX 405-436-8501

SF-0-64 Drs. Kampbell / Wilson GC/MS Plattsburg AFB Cores Units = mg/kg

SAMPLE	Benzene	Toluene	EB	p-Xylene	m-Xylene
36PTR3NS	ND	BLQ	BLQ	BLQ	1.17E-02
66PTR1SS	3.23E-02	5.48E-01	1.52E+00	7.38E+00	1.69E+01
67PTR1SS	ND	BLQ	BLQ	BLQ	BLQ
68PTR1SS	4.75E+00	8.47E+01	1.20E+02	1.14E+02	4.33E+02
70PTR33S	ND	BLQ	BLQ	BLQ	BLQ
71PTR3SS	BLQ	2.64E+00	7.06E+00	1.17E+01	3.44E+01
72PTR3SS	8.47E-03	1.15E+01	1.13E+01	1.65E+01	4.37E+01
74PTR2NS	ND	BLQ	BLQ	BLQ	BLQ
75PTR2NS	ND	BLQ	BLQ	BLQ	BLQ
76PTR2NS	BLQ	5.23E+00	1.11E+01	1.12E+01	2.60E+01
84AB-13	BLQ	BLQ	BLQ	BLQ	BLQ
84BA-1	BLQ	BLQ	BLQ	BLQ	BLQ
84BA-2	ND	BLQ	BLQ	BLQ	BLQ
84BA-3	ND	BLQ	BLQ	BLQ	BLQ
84BA-4	ND	BLQ	BLQ	BLQ	BLQ
84BA-5	ND	BLQ	BLQ	BLQ	BLQ
84BA-6	BLQ	BLQ	BLQ	BLQ	BLQ
84BA-7	BLQ	BLQ	BLQ	BLQ	BLQ
84BA-8	BLQ	BLQ	BLQ	BLQ	BLQ
84BA-9	BLQ	BLQ	BLQ	BLQ	BLQ
84BA-10	ND	BLQ	BLQ	BLQ	BLQ
84BA-11	BLQ	BLQ	BLQ	BLQ	BLQ
84BA-12	ND	BLQ	BLQ	BLQ	BLQ
84BA-14	BLQ	BLQ	BLQ	BLQ	BLQ
84BA-15	ND	BLQ	BLQ	BLQ	BLQ
84BA-16	ND	BLQ	BLQ	BLQ	BLQ
84BA-17	ND	BLQ	BLQ	BLQ	BLQ
84BA-18	ND	BLQ	BLQ	BLQ	BLQ
84BA-19	ND	BLQ	BLQ	BLQ	BLQ
84BA-20	BLQ	BLQ	BLQ	BLQ	BLQ
84CA-1	1.62E-02	6.43E+01	7.02E+01	6.27E+01	2.28E+02
84S-1	ND	BLQ	BLQ	BLQ	BLQ
84S-2	BLQ	8.26E-03	1.15E-02	1.87E-02	5.14E-02
84S-3	BLQ	BLQ	BLQ	BLQ	8.64E-03
84S-4	BLQ	BLQ	BLQ	BLQ	BLQ
84S-5	2.56E-02	1.93E-01	1.00E-01	1.70E-01	4.58E-01
84S-8	2.84E+00	5.37E+01	4.00E+01	4.17E+01	1.24E+02
84S-10	1.16E+00	2.66E+01	1.95E+01	2.17E+01	6.56E+01
84S-12	1.32E+00	2.57E+01	1.88E+01	2.05E+01	6.20E+01
84S-14	4.75E-02	2.10E+00	2.10E+00	2.37E+00	7.43E+00
84S-16	9.95E+00	1.08E+02	7.90E+01	6.71E+01	3.57E+02
84S-18 (1)	4.25E+00	5.93E+01	4.16E+01	4.27E+01	2.04E+02
84S-18 (2)	2.26E+00	2.98E+01	2.84E+01	2.81E+01	8.54E+01
84S-20 (1)	2.04E+00	2.16E+01	1.54E+01	1.48E+01	4.45E+01
84S-20 (2)	3.47E+00	3.73E+01	2.63E+01	2.50E+01	7.33E+01
84S-22	4.81E-01	1.29E+00	3.49E-01	3.27E-01	1.06E+00

Analyst: David A. Kovacs

BLQ = <0.02 µg/ml

Printed: 7/12/94

SF-0-64 Drs. Kampbell / Wilson GC/MS Plattsburg AFB Cores Units = mg/kg

SAMPLE	o-Xylene	1,3,5-TMB	1,2,4-TMB	1,2,3-TMB	TCE
36PTR3NS	BLQ	BLQ	8.49E-03	BLQ	1.30E-01
66PTR1SS	9.23E+00	7.10E+00	1.59E+01	7.28E+00	9.79E-03
67PTR1SS	BLQ	BLQ	BLQ	BLQ	BLQ
68PTR1SS	9.00E+01	4.82E+01	1.06E+02	4.00E+01	7.05E-01
70PTR33S	BLQ	BLQ	BLQ	BLQ	BLQ
71PTR3SS	1.82E+01	1.75E+01	3.39E+01	1.31E+01	BLQ
72PTR3SS	1.53E+01	1.16E+01	2.49E+01	8.12E+00	3.34E-02
74PTR2NS	BLQ	ND	BLQ	ND	1.98E-02
75PTR2NS	BLQ	BLQ	BLQ	BLQ	7.66E-02
76PTR2NS	8.04E+00	7.88E+00	1.88E+01	7.97E+00	3.32E+01
84AB-13	BLQ	BLQ	BLQ	BLQ	BLQ
84BA-1	BLQ	BLQ	BLQ	BLQ	BLQ
84BA-2	BLQ	BLQ	BLQ	BLQ	BLQ
84BA-3	BLQ	BLQ	BLQ	BLQ	BLQ
84BA-4	BLQ	BLQ	BLQ	BLQ	BLQ
84BA-5	BLQ	BLQ	BLQ	BLQ	BLQ
84BA-6	BLQ	BLQ	BLQ	BLQ	BLQ
84BA-7	BLQ	BLQ	BLQ	BLQ	BLQ
84BA-8	BLQ	BLQ	BLQ	BLQ	BLQ
84BA-9	BLQ	BLQ	BLQ	BLQ	BLQ
84BA-10	BLQ	ND	BLQ	ND	BLQ
84BA-11	BLQ	BLQ	BLQ	ND	BLQ
84BA-12	BLQ	BLQ	ND	BLQ	BLQ
84BA-14	BLQ	BLQ	BLQ	ND	BLQ
84BA-15	BLQ	BLQ	ND	ND	BLQ
84BA-16	BLQ	ND	ND	ND	BLQ
84BA-17	BLQ	ND	BLQ	ND	BLQ
84BA-18	BLQ	ND	ND	ND	BLQ
84BA-19	BLQ	BLQ	BLQ	BLQ	BLQ
84BA-20	BLQ	BLQ	BLQ	ND	BLQ
84CA-1	4.61E+01	2.26E+01	4.23E+01	1.95E+01	1.44E+02
84S-1	BLQ	BLQ	BLQ	BLQ	BLQ
84S-2	2.26E-02	2.71E-02	6.71E-02	2.36E-02	BLQ
84S-3	BLQ	BLQ	8.33E-03	BLQ	7.56E-03
84S-4	BLQ	BLQ	BLQ	BLQ	BLQ
84S-5	2.58E-01	2.45E-01	7.96E-01	2.85E-01	7.78E-03
84S-8	3.75E+01	2.53E+01	5.37E+01	2.44E+01	1.91E+01
84S-10	2.04E+01	1.42E+01	3.10E+01	1.34E+01	8.03E+00
84S-12	1.97E+01	1.36E+01	3.09E+01	1.27E+01	7.78E+00
84S-14	2.67E+00	2.07E+00	5.39E+00	2.02E+00	4.08E-01
84S-16	7.31E+01	3.98E+01	1.02E+02	4.24E+01	8.38E+01
84S-18 (1)	4.08E+01	2.28E+01	5.88E+01	2.60E-01	2.91E+01
84S-18 (2)	2.46E+01	1.67E+01	3.55E+01	1.57E+01	2.07E+01
84S-20 (1)	1.40E+01	7.72E+00	1.67E+01	6.62E+00	1.54E+01
84S-20 (2)	2.32E+01	1.22E+01	2.68E+01	1.04E+01	3.02E+01
84S-22	3.78E-01	1.08E-01	2.43E-01	1.16E-01	1.25E+00

Analyst: David A. Kovacs BLQ = <0.02 µg/ml Printed: 7/12/94

SF-0-64 Drs. Kampbell / Wilson GC/MS Plattsburg AFB Cores Units = mg/kg

SAMPLE	Benzene	Toluene	EB	p-Xylene	m-Xylene
84S-24	7.05E+00	6.74E+01	5.30E+01	5.33E+01	2.29E+02
84S-26 (1)	3.10E-02	1.71E+00	2.45E-01	2.29E-01	7.25E-01
84S-26 (2)	4.31E-02	2.05E+00	4.16E-01	3.85E-01	1.19E+00
84S-28	4.73E+00	1.26E+02	7.53E+01	7.12E+01	2.27E+02
84SW	BLQ	BLQ	7.87E-03	7.43E-03	1.39E-02
B8133384	BLQ	BLQ	7.38E+00	8.90E+00	2.45E+01
Quality Control Summary					
MeCl2	ND	BLQ	ND	ND	BLQ
Method Blank (1)	ND	BLQ	BLQ	BLQ	BLQ
Method Blank (2)	BLQ	BLQ	BLQ	BLQ	BLQ
0.1 µg/ml	1.01E-01	1.02E-01	9.97E-02	1.01E-01	9.94E-02
0.1 µg/ml	1.00E-01	9.99E-02	1.01E-01	1.00E-01	1.00E-01
0.1 µg/ml	9.20E-02	9.57E-02	9.56E-02	9.06E-02	9.16E-02
1 µg/ml	1.02E+00	1.02E+00	1.02E+00	1.02E+00	1.02E+00
1 µg/ml	1.01E+00	1.05E+00	1.00E+00	9.79E-01	9.94E-01
1 µg/ml	9.71E-01	9.66E-01	9.94E-01	1.01E+00	1.02E+00
1 µg/ml	1.02E+00	1.04E+00	1.03E+00	1.01E+00	1.01E+00
10 µg/ml	1.09E+01	1.06E+01	1.05E+01	1.02E+01	1.03E+01
10 µg/ml	1.08E+01	1.06E+01	1.03E+01	1.01E+01	1.02E+01
10 µg/ml	1.12E+01	1.10E+01	1.05E+01	1.01E+01	1.04E+01
10 µg/ml QC	9.12E+00	9.80E+00	9.53E+00	9.76E+00	9.99E+00
10 µg/ml QC	1.04E+01	1.02E+01	9.58E+00	9.82E+00	9.75E+00
10 µg/ml QC	1.02E+01	1.01E+01	9.64E+00	9.70E+00	9.65E+00
100 µg/ml	9.44E+01	9.83E+01	9.80E+01	9.78E+01	9.60E+01
100 µg/ml	1.04E+02	1.03E+02	1.02E+02	1.02E+02	9.97E+01
100 µg/ml	1.05E+02	1.02E+02	1.00E+02	1.01E+02	1.01E+02
100 µg/ml	9.98E+01	9.99E+01	9.99E+01	1.00E+02	9.99E+01

Analyst: David A. Kovacs BLQ = <0.02 µg/ml Printed: 7/12/94

SF-0-64 Drs. Kampbell / Wilson GC/MS Plattsburg AFB Cores Units = mg/kg

SAMPLE	o-xylene	1,3,5-TMB	1,2,4-TMB	1,2,3-TMB	TCE
84S-24	4.66E+01	2.80E+01	6.60E+01	2.58E+01	6.04E+01
84S-26 (1)	2.65E-01	4.98E-02	1.41E-01	6.39E-02	1.17E-01
84S-26 (2)	4.58E-01	1.18E-01	2.88E-01	1.24E-01	2.51E-01
84S-28	7.38E+01	3.81E+01	9.09E+01	3.28E+01	7.01E+01
84SW	5.86E-03	BLQ	5.42E-03	BLQ	BLQ
B8133384	4.04E-02	8.47E+00	1.99E+01	7.74E+00	BLQ
Quality Control Summary					
MeCl2	ND	ND	BLQ	ND	ND
Method Blank (1)	BLQ	BLQ	BLQ	ND	BLQ
Method Blank (2)	BLQ	ND	BLQ	ND	BLQ
0.1 µg/ml	9.99E-02	1.04E-01	1.06E-01	1.03E-01	9.77E-02
0.1 µg/ml	1.00E-01	1.00E-01	1.00E-01	1.00E-01	9.89E-02
0.1 µg/ml	9.65E-02	1.00E-01	9.89E-02	1.04E-01	1.05E-01
1 µg/ml	1.02E+00	1.03E+00	1.05E+00	1.03E+00	1.02E+00
1 µg/ml	1.05E+00	9.79E-01	1.05E+00	1.03E+00	1.03E+00
1 µg/ml	9.71E-01	9.47E-01	9.48E-01	9.37E-01	1.01E+00
1 µg/ml	1.06E+00	1.07E+00	1.08E+00	1.08E+00	1.08E+00
10 µg/ml	1.06E+01	1.04E+01	1.05E+01	1.06E+01	1.03E+01
10 µg/ml	1.07E+01	1.08E+01	1.07E+01	1.07E+01	1.04E+01
10 µg/ml	1.14E+01	1.22E+01	1.21E+01	1.21E+01	1.08E+01
10 , 5 (TCE) QC	9.41E+00	9.71E+00	9.58E+00	9.61E+00	4.61E+00
10 µg/ml QC	1.01E+01	1.08E+01	1.07E+01	1.05E+01	N/A
10 , 5 (TCE) QC	1.03E+01	1.08E+01	1.06E+01	1.04E+01	4.95E+00
100 µg/ml	9.83E+01	9.57E+01	9.66E+01	9.61E+01	N/A
100 µg/ml	1.03E+02	1.02E+02	1.03E+02	1.02E+02	1.11E+02
100 µg/ml	1.00E+02	1.01E+02	1.00E+02	1.01E+02	1.06E+02
100 µg/ml	9.98E+01	9.97E+01	9.97E+01	9.97E+01	1.10E+02

Analyst: David A. Kovacs BLQ = <0.02 µg/ml Printed: 7/12/94

Kampbell

TPH

Plattsburgh AFB May 20, 1994

sample	sample wt	tare	tare+wet	tare+dry	absorb	f
70PTR3SS	10.1	30.44	42.45	41.8	0.05	1
71PTR3SS	9.7	50.55	68.25	67.24	0.91	1
72PTR3SS	10.6	29.31	40.02	38.58	0.77	3
84BA-5	9.2	50.83	69.21	67.61	0.01	1
84BA-20	10.6	29.46	42.6	40.78	0.01	1
66PTR1SS	10.3	31.15	41.81	41.35	0.73	3
68PTR1SS	9.6	26.17	38.25	36.19	0.66	9
84S-1	9.6	31.15	47.83	46.88	0.08	1
84S-8	10	51.56	69.07	67.18	0.83	3
84S-10	9.7	50.16	67.2	66.65	0.37	3
84S-12	10.1	51.32	71.34	70.97	0.46	3
84S-14	9.8	50.83	69.06	68.79	0.01	1
84S-16	10	55.48	74.4	72.06	1.4	3
84S-18	10.5	29.88	50.7	48.35	0.57	9
84S-20	10.5	51.6	70.06	66.62	0.87	1
84S-24	9.6	29.14	44.02	41.86	0.46	9
84S-28	9.6	31.48	50.41	47.1	0.9	1

SAMPLE	DRY WT	MG/ML	MG/KG	
70PTR3SS	9.55	0.10	151	
71PTR3SS	9.15	2.06	~~3383~~	3,380
72PTR3SS	9.17	1.64	~~8025~~	8,020
84BA-5	8.40	0.04	~~76~~	<70
84BA-20	9.13	0.04	~~70~~	<70
66PTR1SS	9.86	1.52	~~6948~~	6,950
68PTR1SS	7.96	1.33	~~22547~~	22,500
84S-1	9.05	0.14	229	
84S-8	8.92	1.81	9150	
84S-10	9.39	0.65	~~3094~~	3,090
84S-12	9.91	0.84	~~3807~~	3,810
84S-14	9.65	0.04	~~66~~	<70
84S-16	8.76	3.88	~~19936~~	19,900
84S-18	9.31	1.10	~~15920~~	15,900
84S-20	8.54	1.94	3400	
84S-24	8.21	0.84	~~13798~~	13,800
84S-28	7.92	2.03	~~3846~~	3,850

Report following as <70 mg/kg:
67PTR1SS
74PTR2NS
75PTR2NS
84S-2,3,4,5,14,22,26
84BA- 1 through 20

84 BA - Water Table at 33.6' below grade

Drilled 10.0' - cored 2.5'; recovered 2.6'

84 BA-1	12.1	12.5	oxidized coarse sand
84 BA-2	11.7	12.1	Same
84 BA-3	11.3	11.7	fine silty sand
84 BA-4	10.9	11.3	oxidized medium
84 BA-5	10.5	10.9	
84 BA-6	10.1	10.5	
discard 0.3			

Drilled to 31.5', cored to 34.0', recovered 2.5'

84 BA-7	33.6	34.0	
84 BA-8	33.2	33.6	
84 BA-9	32.8	33.2	
84 BA-10	32.4	32.8	
84 BA-11	32.0	32.4	
84 BA-12	31.6	32.0	
84 BA-13	31.5	31.6	(NO SUB-SAMPLE - TOO LITTLE

Drilled to 34.0', cored to 36.5', recovered 2.5'

84 BA-14	36.1	36.5	
84 BA-15	35.7	36.1	
84 BA-16	35.3	35.7	
84 BA-17	34.9	35.3	
84 BA-18	34.5	34.9	
84 BA-19	34.1	34.5	
84 BA-20	34.0	34.1	(NO SUB-SAMPLE - TOO LITTLE

Continued on Page

Read and Understood By

Signed Date Signed Date